## Kiefer Lam

Registration number 100166387

2020

# **Real-time Ray Tracing**

Supervised by Dr Stephen Laycock



#### **Abstract**

This document explains how to use the class file cmpreport.cls to write your reports. The class file has been designed to simplify your life; many things are done for you. As a consequence some commands presented here are specific to the class file whether they are new commands or customized versions of commonly known LATEX commands.

### Acknowledgements

This section is used to acknowledge whoever's support and contribution. The command that introduces it is ignored in the project proposal, literature review and progress report. It is used in the final report, but is not compulsory. If you do not have an acknowledgements command in your preamble then there won't be any acknowledgement section in the document produced. *Abstract* and *Acknowledgements* sections should fit on the same page.

## Contents

1	Introduction			
	1.1	Aims a	and Motivations	5
	1.2	Proble	ms	5
2	Lite	rature R	eview	5
3	Design and Implementation			
	3.1	OpenC	L and OpenGL	5
		3.1.1	Host	5
		3.1.2	Device	5
	3.2	Kernel	Structure	5
		3.2.1	Ray Trace Kernel	5
		3.2.2	Image Kernel	5
		3.2.3	Reset Kernel	5
		3.2.4	Single Independent Kernel	5
	3.3	Ray Ge	eneration	5
		3.3.1	Primary Rays	5
		3.3.2	Reflection	5
		3.3.3	Refraction	5
	3.4	Interse	ction With Objects	5
		3.4.1	Sphere Intersection	5
		3.4.2	Triangle Intersection	5
	3.5	Genera	ting An Image	5
		3.5.1	Phong Model	5
4	Results and Testing			5
5	Future Work			5
6	Conclusion			5

Reg: 100166387

Reg: 100166387 4

#### 1 Introduction

- 1.1 Aims and Motivations
- 1.2 Problems
- 2 Literature Review
- 3 Design and Implementation
- 3.1 OpenCL and OpenGL
- 3.1.1 Host
- 3.1.2 Device
- 3.2 Kernel Structure
- 3.2.1 Ray Trace Kernel
- 3.2.2 Image Kernel
- 3.2.3 Reset Kernel
- 3.2.4 Single Independent Kernel
- 3.3 Ray Generation
- 3.3.1 Primary Rays
- 3.3.2 Reflection
- 3.3.3 Refraction
- 3.4 Intersection With Objects
- 3.4.1 Sphere Intersection
- 3.4.2 Triangle Intersection
- 3.5 Generating An Image
- 3.5.1 Phong Model
- 4 Results and Testing
- **5 Future Work**

Reg. Conclusion